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U. S. DEPARTMENT OF AGRICULTURE

Cooperative ECONOMIC INSECT REPORT

Issued by

PLANT PEST CONTROL BRANCH
AGRICULTURAL RESEARCH SERVICE
UNITED STATES DEPARTMENT OF AGRICULTURE

AGRICULTURAL RESEARCH SERVICE

PLANT PEST CONTROL BRANCH

ECONOMIC INSECT SURVEY SECTION

The Cooperative Economic Insect Report is issued weekly as a service to American Agriculture. Its contents are compiled from information supplied by cooperating State, Federal, and industrial entomologists and other agricultural workers. In releasing this material the Branch serves as a clearing house and does not assume responsibility for accuracy of the material.

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Volume 4 November 19, 1954 No. 46

COOPERATIVE ECONOMIC INSECT REPORT

Highlights of Insect Conditions

First record of an ALFALFA ROOT WEEVIL in Texas (page 1002).

HESSIAN FLY survey in Kansas, summer 1954. (page 1003).

WALNUT HUSK FLY found in Washington for the first time. (page 1004).

A rarely reported LACE BUG collected in South Orange, New Jersey. (page 1005).

Summary of INSECT CONDITIONS - 1954 - Michigan (page 1009), Wyoming (page 1012).

SURVEY METHODS for potato-infesting aphids in Maine. (page 1015).

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Reports in this issue are for the week ending November 12, 1954, unless otherwise designated.

WEATHER BUREAU'S 30-DAY OUTLOOK
*Mid-November to mid-December 1954

The Weather Bureau's 30day outlook for the period from mid-November to mid-December calls for temperatures to average above normal in the eastern half of the United States except near normal in New England and much above normal in the Ohio Valley. Below normal temperatures are indicated west of the Continental Divide with greatest departures in northern California. Precipitation amounts are expected to equal or exceed normal over most of the nation except for subnormal amounts along the Atlantic Seaboard and in the extreme Southwest.

*This report released by the Weather Bureau on November 16, 1954.

Weather forecast given here is based on the official 30-day "Resume and Outlook," published twice a month by the Weather Bureau. You can subscribe through Superintendent of Documents, Washington, D. C. Price: $4.80 a year, $2.40 for six months.

WEATHER FOR THE WEEK ENDING NOVEMBER 16, 1954

Unseasonably warm, dry, sunny weather prevailed over most of the Country last week. Maximum temperatures were generally in the 70's in the southern portion of the Country and on a few days even in the north-central Interior where temperatures for the week averaged from 6° to 12° above normal. With clear skies favoring radiation nighttime temperatures were on the cool side, however, minima ranged in the 40's and 50's in the South and near or below freezing in the North. Measurable precipitation was nearly all limited to areas west of the Continental Divide, eastern Texas, extreme southern and western portions of Louisiana, and in Florida where rains were unusually heavy in some localities. Red Bluff, Calif., had a weekly total of 6.36 inches which was 5.90 inches above normal, and Key West, Fla., had 20.65 inches of which 19.88 inches fell in a 24-hour period ending 7:30 a.m., the 13th. At the end of the period light to locally heavy rains were falling in the area extending from the lower Mississippi Valley to the Atlantic Coast. (Summary Supplied by U.S. Weather Bureau).

CEREAL AND FORAGE INSECTS

SOUTHWESTERN CORN BORER (Diatraea grandiosella) - KANSAS - Infestation found in corn fields of Cloud, Graham, Jewell, Lincoln, Osborne, Ottawa, Phillips, Rooks, Russell and Smith Counties. Infestations in northern counties were generally light (1 to 4 percent of the stalks girdled); however, a field of northeast Russell County had 50 percent of the stalks lodged as result of girdling. (Matthew).

FALL ARMYWORM (Laphygma frugiperda) - KANSAS - During a survey of corn fields of Graham, Lincoln, Osborne, Phillips, Rooks Russell, Ottawa and Smith Counties, it was found that an average of 5 percent of the ears had dropped from the stalks as the result of prior feeding of this species in the shank. (Matthew). ARIZONA - Reported to have been the most serious pest of autumn planting of sweet corn in the State. It destroyed almost 300 acres in Maricopa County and growers gave up on control. (Ariz. Coop. Rept.).

GREENBUG (Toxoptera graminum) - KANSAS - None found in any of the wheat fields surveyed for insect infestations in following counties: Clay, Cloud, Decatur, Graham, Jewell, Lincoln, Norton, Osborne, Ottawa, Phillips, Rooks, Russell, Sheridan, Smith, Thomas and Washington. (Matthew).

CORN FLEA BEETLE (Chaetocnema pulicaria) - ILLINOIS - Still active on warm days. (Petty).

THREE-CORNERED ALFALFA HOPPER (Spissistilus festinus) - VIRGINIA - Light in an alfalfa field of Henrico County. (Davis).

LYGUS BUGS - UTAH - Still active in alfalfa fields and on weeds during warm days. (Knowlton).

PEA APHID (Macrosiphum pisi) - UTAH - Still numerous and laying eggs in some succulent alfalfa fields of the northern part of the State. (Knowlton).

AN ALFALFA ROOT WEEVIL (Ophryastes sp., det. R. E. Warner). TEXAS - Medium to heavy local infestation on alfalfa in Ward County. Causing much of the alfalfa to die around the town of Barstow. This is the first record of this insect in Texas. (Harrison).

YELLOW-STRIPED ARMYWORM (Prodenia ornithogalli) - TEXAS - Medium local infestation on "button clover" and oats in Hood County. (Hillman).

WHITE GRUBS - KANSAS - Heavy infestation in a wheat field of Norton County. Heavy feeding had killed many of the plants, however, few grubs (2 per yard of drill row) were found. Numerous diggings throughout the field gave evidence that animal predators apparently had destroyed most of the grubs. (Matthew).

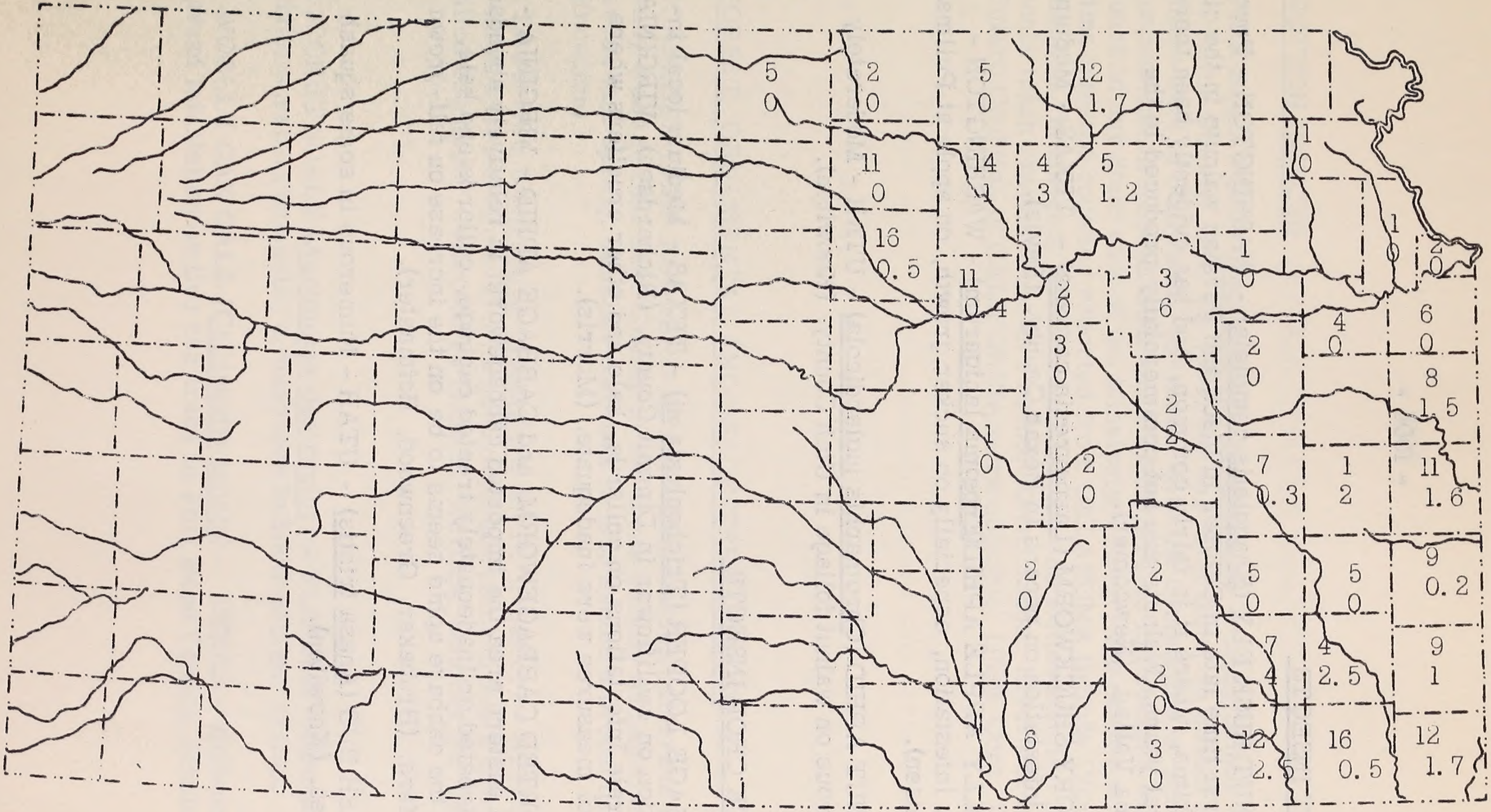
AN APHID (Rhopalosiphum subterraneum) - KANSAS - Infestation found in one field of wheat in northeast Russell County. Some of the infested plants were wilted but this may have been the result of insufficient sub-soil moisture. (Matthew).

A CHINCH BUG (Blissus leucopterus insularis) - FLORIDA - Causing heavy infestations on St. Augustine grass at several homes in the Lake Jessie area, Winter Haven. Control measures taken. (Wesson).

RHODES-GRASS SCALE (Antonina graminis) - TEXAS - Medium local infestation on St. Augustine grass in Bexar County, also damaging to lawns of this grass. (Tate). FLORIDA - Nymphs and adults averaged up to 25 per square foot on Bermuda grass in Miami. (Link).

TERMITES - TEXAS - Medium to heavy widespread infestation on pasture grasses in Wilson and Bexar Counties. Severe damage to pasture grasses. Spots up to 30 feet in diameter have been killed out. (Fuller, Davis).

Hessian Fly Survey in Kansas
Summer 1954



Top figure number of fields examined.
Bottom figure average percent stems infested.
Fifty stems examined i n each field. (Matthew, Jones).

FRUIT INSECTS

WALNUT HUSK FLY (*Rhagoletis completa*) - WASHINGTON - Found for first time late in October in black and Persian walnuts in the city of Yakima, where it is fairly common, and has evidently been there several years. Walnuts are not commercially produced in the Yakima Valley. (Newcomer).

HICKORY SHUCKWORM (*Laspeyresia caryana*) - TEXAS - Medium local infestation on pecans in Bexar County. (Davis).

WOOLLY APPLE APHID (*Eriosoma lanigerum*) - WASHINGTON - Heavy infestation, especially on sucker growth, on apple at Pullman. (Johansen).

WALNUT APHID (*Chromaphis juglandicola*) - UTAH - Moderately numerous on walnut foliage in Utah County. (Knowlton).

TRUCK CROP INSECTS

CABBAGE LOOPER (*Trichoplusia ni*) - TEXAS - Medium local infestation on cauliflower in Dimmit County. (Richardson). VIRGINIA - Moderate infestations on collards, kale and other crucifers where control measures were inadequate. (Morris).

IMPORTED CABBAGEWORM and CABBAGE APHID - VIRGINIA - In the eastern area the imported cabbageworm is relatively abundant on untreated or inadequately treated cabbage, collards and kale, while the cabbage aphid seems to be on the increase on fall-grown crucifers. (Brubaker, Greenwood, Hofmaster).

SQUASH BUG (*Anasa tristis*) - UTAH - Numerous in some squash patches. (Knowlton).

COTTON INSECTS

PINK BOLLWORM (Pectinophora gossypiella) - OKLAHOMA - Found in Payne County, Oct. 21, 1954, for the first time, in a field 1-1/2 miles west of Stillwater. (Bryan). With the completion of gin trash inspections in TENNESSEE and MISSISSIPPI no infestations were found in any State east of the Mississippi River. Six additional first-time infested counties reported from OKLAHOMA include Choctaw, Haskell, Muskogee, Oklahoma, Pontotoc and Pottowatomie. Large scale trash examinations in Fresno, Kern, Kings, Riverside and Tulare Counties in CALIFORNIA were negative. (PBW Cont. Proj.).

FOREST, ORNAMENTAL AND SHADE TREE INSECTS

BOXELDER LEAF ROLLER - UTAH - Egg masses numerous on many trees in Salt Lake County in the areas heavily damaged by larvae last spring. Another outbreak in 1955 seems a probability. (Knowlton).

A LACE BUG (Stephanitis globulifera det R. I. Sailer) - NEW JERSEY - Caused serious injury to a large andromeda plant in South Orange, and killed one plant. Collected by Rose E. Warner, October 24. (Sailer).

COCONUT SCALE (Aspidiotus destructor) - FLORIDA - Nymphs and adults severely damaging a mangrove in South Miami. (Link).

A WOOLLY OAK GALL (Callirhytis lanata) - TEXAS - Medium widespread infestation on live oak trees in Fort Bend County. (Fuller).

INSECTS AFFECTING MAN AND ANIMALS

FOWL TICK (Argas persicus) - TEXAS - Heavy local infestation on chickens in Gray County. (Thomas).

STICKTIGHT FLEA (Echidnophaga gallinacea) - TEXAS - Heavy local infestation in chicken and turkey houses in Parker County. (Davis).

NORTHERN FOWL MITE (Bdellonyssus sylviarum det. E. W. Baker) - ARIZONA - Found in large numbers in a ward of a local hospital during the week of July 25, 1954. This mite is an ectoparasite of birds and its occurrence under these circumstances is unusual. It was suggested that birds must have congregated in or near the building. There were no reports of the mites feeding on man. (Ariz. Coop. Rept.).

HOUSE FLIES - UTAH - Still fairly numerous and annoying in many communities. (Knowlton).

STORED-PRODUCTS INSECTS

ARKANSAS - During week of November 1, samples of grain were taken from the same bins in north Logan, Gross, north Arkansas and Jefferson Counties that were visited week of October 27. As grain in 15 bins was sold or planted, samples were taken from only 35 of the original 50. Insects were infesting 30 bins and the number of bins in which they were found is as follows: (Number in parenthesis is the number of bins found previously) saw-toothed grain beetle (Oryzaephilus surinamensis) 20 (33), flour beetles (Tribolium sp.) 14(22), grain beetles (Laemophloeus sp.) 5(10), lesser grain borer (Rhyzopertha dominica) 2(5), and cadelle (Tenebroides mauritanicus) 2(1). (Warren, Barnes).

INDIAN-MEAL MOTH (Plodia interpunctella) - TEXAS - Heavy local infestation on stored grain sorghum in Victoria County. (McCombs).

MISCELLANEOUS INSECTS

BOXELDER BUG (Leptocoris trivittatus) - MARYLAND - Reports from Baltimore, Frederick and Montgomery Counties of nuisance from this insect. (U. Md., Ent. Dept). VIRGINIA - Moving into dwellings and causing concern in Montgomery, Roanoke and Bedford Counties and also in Fredericksburg. (Morris, Reynolds and Kash). UTAH - Continues to be a household problem in many localities. (Knowlton).

AN ORIBATID MITE (Family Galumidae det. G. Wharton) - MARYLAND - Mites in large numbers swarming in a house at Cambridge. Source unknown. (U. Md., Ent. Dept.).

LIGHT TRAP COLLECTIONS - ARKANSAS - From November 4 to 10 at the Rice Branch Station 15 armyworm (Pseudaletia unipuncta) adults and 10 black cutworm (Agrotis ypsilon) moths were collected. At Fayetteville from October 29 to November 12, adults of 8 corn earworm (Heliothis armigera), 2 black cutworm, and 1 armyworm were collected. The last armyworm adult was taken at Fayetteville on October 31. Larval infestations of H. armigera averaged 22 per 100 sweeps of a 12-inch net November 10 on alfalfa in the northwestern area. (Warren, Barnes).

RECENT IMPORTANT INTERCEPTIONS AT PORTS OF ENTRY

A living larva of the bean butterfly, Lampides boeticus (L.), (Lycaenidae) was intercepted recently in a flower lei (Canavalia sp.) in ships' baggage from Hawaii at San Pedro, California (Reynolds). This insect has been reported injurious to various legumes in many parts of the world. It is said to occur throughout most of Africa Central and Southern Asia, Europe and the Pacific Islands, including Hawaii. It is not known to occur in the continental United States. The bean butterfly has been reported causing serious injury to leguminous crops in Lebanon. It is said to be a common pest of beans in Japan and a common butterlfy in Hawaii where it is thought to have been introduced before 1880. There the larvae feed on peas, beans, and other legumes. In many parts of its extensive range it is considered a minor pest occasionally becoming serious in local areas. Life history studies indicate that the adult butterflies deposit eggs in the flower pods and buds of the plant. The larvae feed on the flowers, seeds, and occasionally in the stalks. Pupation occurs in fallen leaves or trash on the soil or on leaves or stems. Two or more generations have been reported. Hibernation is said to occur in the egg stage in Japan. Larvae of the bean butterfly have been intercepted on numerous occasions in flower leis from Hawaii, a few times in beans and peas from Hawaii and once in soy beans from Japan at West Coast ports. (Compiled by Plant Quarantine Branch).

SUMMARY OF INSECT CONDITIONS - 1954

MICHIGAN

Reported by Ray Hutson

The most notable entomological event in Michigan during the past season was the discovery of an infestation of first instar GYPSY MOTH (Porthetria dispar) larvae on the south side of the City of Lansing, May 19, 1954. Mobilization of USDA and State Control officials resulted in the scouting delimitation and spraying of an area in excess of 85,000 acres. This comprised the known infested area plus a barrier area surrounding it. Reports of moth trapping on approximately 1,300,000 acres show the finding of one egg mass in the sprayed area and three very localized infestations outside the sprayed area.

Incidence of other insects deviated only in minor ways from the usual pattern. The active season began late and continued into October. GRASSHOPPERS, chiefly Melanoplus mexicanus and M. femur-rubrum, and CUTWORMS were slightly more numerous than usual. Peridroma margaritosa and Pseudaletia unipuncta infestations occurred along with the usual cutworm species. Thrips, Frankliniella tritici, were annoying all over central Michigan at harvest.

Fruit Infesting Insects and Mites

PLUM CURCULIO (Conotrachelus nenuphar) was probably responsible for more damage than any other fruit infesting insect. While it was generally well controlled on peach, it caused noticeable damage on red tart cherries, sweet cherries, apples and blueberries wherever any slip-up in spray applications occurred. PEAR PSYLLA (Psylla pyricola), and ROSY APPLE APHID (Anuraphis roseus) affecting apple were of no great consequence while CODLING MOTH (Carpocapsa pomonella), with the help of a hot spell late in September, staged a small rally. RED-BANDED LEAF ROLLER (Argyrotaenia velutinana) due to the same September weather managed almost a full third brood but earlier control reduced numbers until only slight damage resulted.

Damage in individual Amber Gem and Elberta peach orchards went as high as 18 percent from ORIENTAL FRUIT MOTH (Grapholitha molesta) as a result of the late hot spell. APPLE MAGGOT (Rhagoletis pomonella) was severe in poorly sprayed orchards while fewer infestations of blueberries by R. pomonella were observed due to better spray timing. TWO-SPOTTED SPIDER MITES (Tetranychus bimaculatus) and EUROPEAN RED MITE (Metatetranychus ulmi) were normally abundant. Established cherry pests such as CHERRY FRUIT FLY (Rhagoletis cingulata) and BLACK CHERRY FRUIT FLY (R. fausta) were troublesome as usual in home plantings. A late season-mixed infestation of CHERRY FRUITWORM (Grapholitha packardi) and the PEACH TWIG BORER (Anarsia lineatella) were locally troublesome in the northern cherry growing area.

Soil Infesting Insects

ONION MAGGOT (Hylemya antiqua), SEED-CORN MAGGOT (H. cilicrura) and CABBAGE MAGGOT (H. brassicae) were extremely numerous in early spring but dry hot weather came in early June and they disappeared. Control measures were effective where applied. WHITE GRUBS (Phyllophaga) of Brood A were moderately abundant. WIREWORMS, chiefly Agriotes, were sporadically troublesome. Introductions of JAPANESE BEETLE (Popillia japonica) required quarantine treatment on approximately 1,000 acres in the State this year.

Field Crop Insects

EUROPEAN CORN BORER (Pyrausta nubilalis) was slightly above normal in abundance as shown by fall survey while CORN EARWORM (Heliothis armigera) was more numerous than in years. POTATO LEAFHOPPER (Empoasca fabae) was abundant on alfalfa and field beans in all sections of the State. POTATO APHID (Macrosiphum solanifolii) was common on potatoes, and tomatoes late in the summer. VETCH BRUCHID (Bruchus brachialis) was reported from all parts of the Lower Peninsula. MEXICAN BEAN BEETLE (Epilachna varivestis) continued troublesome on snap beans for canning with a few infestations on field beans.

Forest Insects

EUROPEAN PINE SHOOT MOTH (Rhyacionia buoliana), WHITE-PINE WEEVIL (Pissodes strobi) and the EUROPEAN PINE SAWFLY (Neodiprion sertifer) were abundant over the Lower Peninsula. Pachystethus oblivia caused extensive defoliation in Christmas tree, highway, and forest plantings and larvae became numerous about the roots of many red, jack, and scotch pine plantings in upper part of the Lower Peninsula. LARCH CASEBEARER (Coleophora laricella) was widespread in its occurrence while the LARCH SAWFLY (Pristiphora erichsonii) was reported only sparingly from a few small infestations in the Upper Peninsula and Higgins Lake in the Lower Peninsula. A JACKPINE SAWFLY (Neodiprion banksianae) was the most commonly reported sawfly, although N. lecontei was also widespread and Pikonema alaskensis reported. Moderate infestations of SPRING CANKERWORM (Paleacrita vernata) and FALL CANKERWORM (Alsophila pometaria) were scattered through the woodlots of the southern half of the Lower Peninsula. The seemingly endemic WALKINGSTICK (Diapheromera femorata) infestation near West Branch was quite noticeable in the late summer. A noticeable increase in infestation by a western pitch ball moth (Petrova albicapitana) was apparent in the northern areas both above and below the straits of Mackinac. Near Newberry, the BRONZE BIRCH BORER, (Agrilus anxius) is beginning to appear in an area of about three square miles infested by BIRCH LEAFMINER (Fenusa pusilla). (Hutson).

SUMMARY OF INSECT CONDITIONS - 1954

WYOMING

Reported by Martin M. Poyner

Forage Crop Pests

Legume insects caused an estimated $7,248,000.00 damage to alfalfa and other legume forage crops during the growing season of 1954. ALFALFA WEEVIL (Hypera postica) caused moderate to severe damage in alfalfa fields where early control measures were not used. TARNISHED PLANT BUG (Lygus lineolaris) caused an estimated $65,000.00 damage to the alfalfa seed-growing areas. Reports are that this insect was probably worse this year than in the past few years. CLOVER SEED CHALCID (Bruchophagus gibbus) was found to be causing considerable damage in the alfalfa seed-growing areas. Other insects that caused light to moderate damage to legume crops were as follows: aphids, pea aphid (Macrosiphum pisi), armyworm (Pseudaletia unipuncta), blister beetles (Epicauta sp.), spider mites, and grasshoppers.

Vegetable Pests

The most serious pest of vegetables was the MEXICAN BEAN BEETLE (Epilachna varivestis) which caused moderate to severe damage to garden beans in the southeastern area. CORN EARWORM (Heliothis armigera) caused severe to very severe damage to sweet corn plantings. CABBAGE APHID (Brevicoryne brassicae) and IMPORTED CABBAGEWORM (Pieris rapae) caused light damage to cabbage plantings. SQUASH BUG (Anasa tristis) lightly damaged some squash plantings in southeastern area.

Field Crop Insects

EUROPEAN CORN BORER (Pyrausta nubilalis) was found to be more numerous in sweet corn plantings in Goshen County, than in field corn. In sweet corn plantings, the European corn borer infestation was found to be 5 larvae per 100 plants. A very light infestation which was found in Goshen and Platte Counties seemed to follow the water routes. POTATO PSYLLID (Paratrioza cockerelli) was throughout the potato growing areas. As hot weather approached the lower elevations, the psyllid appeared to seek cooler areas in higher elevations. Some damage occurred to early potatoes in Goshen County. ARMYWORM (*Pseudaletia unipuncta*) adults migrated into the State from outside, causing moderate to severe damage to many crops, including barley, oats, alfalfa, grass crops, other hay crops and sugar beets. Good control was obtained in some areas. CORN LEAF APHID (*Rhopalosiphum maidis*) was found throughout the State wherever corn is grown. BEET LEAFHOPPER (*Circulifer tenellus*), in Goshen County, caused curly top in some areas. Moderate infestations of CORN EARWORM (*Heliothis armigera*) were in all corn fields that were surveyed for this insect. CLOVER MITE (*Bryobia praetiosa*) was very abundant in some areas. FALSE WIREWORMS caused considerable damage to fall wheat in some Platte County areas. GRASSHOPPERS caused slight to moderate damage to cropland borders in some areas throughout the State and moderate damage to winter wheat borders in the southeastern part.

Shade Tree, Fruit Tree, and Ornamental Insects

EUROPEAN ELM SCALE (*Gossyparia spuria*) caused slight to severe damage to American elm wherever this tree is grown in the State. PINE NEEDLE SCALE (*Phenacaspis pinifoliae*) was more numerous in some sections than usual. CHERRY-SLUG was quite numerous on both cherry trees and other closely related plants in some areas. CODLING MOTH (*Carpocapsa pomonella*) caused moderate to severe damage to home apple orchards. A cicada, abundant in some areas, damaged apples. Rose leafhopper was very numerous in some of the areas on rose bushes. BOXELDER BUG (*Leptocoris trivittatus*) was very numerous wherever this tree is grown. and migrated into houses.

Livestock Insects

The estimated losses to cattlemen from some of these insects are as follows: CATTLE LICE -- $2, 602, 300, CATTLE GRUB (*Hypoderma lineatum*) -- $6, 507, 960. 00, HORN FLY (*Siphona irritans*) -- $8, 677, 280. 00 and SHEEP KED (*Melophagus ovinus*) -- $2, 011, 460. 00.

Insects Affecting Man

Apparently HOUSE FLIES were more numerous this year than last, and were annoying to residents in many areas. **MOSQUITOES** caused wide concern particularly in the western sections. BLACK WIDOW SPIDER (Latrodectus mactans) was more numerous than usual in different localities in the State.

Forest Insects

BLACK HILLS BEETLE (Dentroctonus ponderosae) infestation was checked in northern Johnson County. The balance of the county is under control. Woodpeckers, a natural predator, increased in numbers and attacked this beetle.

Rangeland Insects

201, 559 acres of rangeland **GRASSHOPPERS** and 2, 990 acres of MORMON CRICKETS were controlled in the State this year. Moderate to severe infestations of LEAFHOPPERS were found on many meadow land acres in northwestern areas causing concern to livestockmen. Surveys show that there is a build up in GRASSHOPPER populations where control work was done a few years ago.

SURVEY METHODS

Populations of Potato-Infesting Aphids and of Aphid Eggs on Primary Hosts in Maine

Since 1942 a study of the populations of winged and wingless aphids and of aphid eggs on the more important primary hosts of three species of potato-infesting aphids in northeastern Maine has been in progress. The potato-infesting species included in the study have been the buckthorn aphid (*Aphis nasturtii* Kltb. (=*abbreviata* Patch)), the green peach aphid (*Myzus persicae*) and the potato aphid (*Macrosiphum solanifolii*). The more important primary hosts of these aphids, respectively, are alder-buckthorn (*Rhamnus alnifolia*) Canada plum (*Prunus nigra*) and wild roses (*Rosa* spp., chiefly swamp rose, *R. palustris*).

During the course of this study some methods have been devised and tested which appear to provide estimates of populations of the aphids and of aphid eggs on the more important primary hosts. Some of these methods appear to be suitable while others are not entirely satisfactory. All can doubtless be improved upon. An outstanding result of the study has been the realization that except in the instance of the buckthorn aphid, fall and spring surveys of aphid egg abundance are of much reduced value without a knowledge of the size and composition of the fall aphid populations on the primary hosts. A knowledge of population trends of the aphids on these hosts in spring is also of value in anticipating the probable time and size of the spring migrations since the operation of many factors may tend to change the outlook for size of the spring migration.

Populations of the Aphids

The potato aphid: One hundred randomly located units are examined in determining the size of potato aphid population at each observation station of wild roses. Depending upon time of year and stage of plant growth three units of sample are employed. Two of these are used in the spring and the other one in the fall. Both units in the spring are located on the terminals of limbs, branches, or stems of the plant. The early-season unit is all new growth on the terminal 6 inches at these places on the plants. This unit is used from the time the eggs begin to hatch until the young leaves begin to unfold. From then until the spring migration of the aphid is complete the unit is all new growth on enough buds at branch or stem terminals to make a total of 6 inches of new growth. Records for each unit include the number of buds examined having new growth, the number of buds infested by the potato aphid, and the total number of potato aphids found. These data are essential in comparing potato aphid population sizes at different places, and in determining population trends at any one place. Aphid populations are expressed as (1) the average numbers of winged and of wingless potato aphids per unit, per infested unit, per bud or new growth from single buds, and per infested bud; and (2) the percentage of infested units or buds.

The whole compound leaf is the unit of sample from the start of the fall migration until fall breeding is complete. Fall populations of the potato aphid are expressed as the average number of potato aphids per leaf and the percentage of leaves infested. After the leaves begin to fall an estimate is made of the percentage of leaves still attached.

The green peach aphid: Populations of the green peach aphid on Canada plum are determined (1) at the spring peak of abundance of aphid colonies, and (2) from the beginning time of the fall migration until all of the leaves have fallen. The determination in spring is made at the time when the spring migration of the green peach aphid is at the peak, usually about the middle of June. This determination is based upon (1) the number of aphid colonies observed by two workers concurrently searching, for the same unit of time (usually 10 minutes), in separate parts of the same plum thicket, and (2) collections of a representative number of the colonies found. The workers must know how to recognize at a glance the presence of an aphid colony, as well as the locations and types of growth most likely to be infested. Examination of the collected specimens is made with a binocular microscope to determine the number of colonies containing the green peach aphid only, and the number with species in addition to the green peach aphid. Abundance of the aphid is expressed as the average number of aphid colonies found per minute of observation, the percentage of colonies infested only by the green peach aphid, and the percentage of green peach aphid colonies also containing other species of aphids.

Fall populations of the aphid are determined by examining 100 randomly located leaves on plants of Canada plum in each thicket. Once the leaves begin to fall, an estimate is made of the percentage of leaves still attached to the plum trees. Fall populations of the aphid are expressed as the average numbers of winged and of wingless forms per leaf and per infested leaf.

The buckthorn aphid: Populations of the buckthorn aphid are determined on alder buckthorn from the beginning time of the fall migration until fall breeding is complete or until the apterous forms become so numerous that extensive movement of the aphid occurs over the plants. After the foliage begins to drop records are made to show the percentage of leaves still attached. At each location a count consists of examining 100 randomly-located, attached leaves. The population is expressed as the average numbers of winged and of wingless buckthorn aphids per leaf and the percentage of leaves infested.

Because of the small size and the breeding habits of this aphid, no satisfactory method has been devised to determine spring populations of the buckthorn aphid on its primary host. Some indication has been obtained at the spring peak of aphid abundance by examining for aphids all new growth of three or four terminal buds at the tips of branches or stems. Population size is expressed as average number of colonies per branch or stem terminal and the percentage of terminals infested.

Populations of Aphid Eggs

Populations of aphid eggs on the primary hosts are determined semi-annually, in the fall after egg deposition is complete and again in late spring just before hatching starts. These times usually are early in November and late in April.

Canada plum and alder-buckthorn: Nine bunches of 10 twigs each are randomly cut from branch or stem terminals in 9 separate sections of each thicket of Canada plum or patch of buckthorn. The terminal 9 buds on each twig are then examined in the laboratory with the aid of a binocular microscope to determine the number of aphid eggs by each bud. Records by bud position or number are made to show for each the number of fully distended and the number of shrivelled eggs found. An egg is considered as being shrivelled if it is not perfectly distended. Populations are expressed as the average number of each kind of eggs per 100 buds.

Wild roses: Examinations of wild roses for aphid eggs are made in the field with the aid of a reading glass and a hand lens. Two units of sample are employed in each rose patch, viz., the terminal 9 buds on each of 30 randomly located branch or stem terminals, and 270 individual crotches of branches and limbs. Records are made to show by bud position or crotch number the numbers of fully distended and shrivelled eggs. An egg is considered as being shrivelled if it is not perfectly distended. Populations are expressed as the numbers of fully distended and shrivelled eggs per 100 buds or crotches.

Location of Sample Units

Random location of sample units in all of these procedures is essential, both vertically on the plants and to include all parts of the area covered by the host at each station. The results of some observations of the potato aphid on swamp rose illustrate the importance of random sampling in any effort to compare between locations, populations of the aphid or of aphid eggs. Equally important considerations are involved for other species of aphids on their primary hosts.

In the fall the potato aphid is more abundant on yellowing leaves than on green ones. Yellowing leaves are usually more abundant inside and near the base of the plants than at branch or stem terminals or outer parts of the plants. In the spring the aphids breed most commonly at the tip of new growth, irrespective of location on the plant. Frequently, the populations are larger than elsewhere on young rose shoots near the base of the plant and inside the rose patch. Populations of the eggs and of the aphids are larger, both in fall and in spring, on rose plants growing inside hedgerows or narrow bands of trees than on similar plants growing outside or in unprotected places. The composition of the aphid population and of the aphid eggs may vary tremendously on rose plants within a small patch that appears to be very uniform as to sameness of environmental conditions. (W. A. Shands and G. W. Simpson).